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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/17/2006

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EXAMINER

BEHM, HARRY RAYMOND

ART UNIT

PAPER NUMBER

2838

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/553,756	Applicant(s) OKAMURA ET AL.	
	Examiner HARRY BEHM	Art Unit 2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12, 13, 15-18, 20-23, 25, 27, 28 and 30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17, 18, 20-23, 25 and 30 is/are allowed.
- 6) ☒ Claim(s) 12 and 16 is/are rejected.
- 7) ☒ Claim(s) 13, 15, 27 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/1/09 has been entered.

Response to Arguments

Applicant's arguments filed 6/1/09 with respect to amended Claim 12 have been fully considered but they are not persuasive. Applicant argues DeDoncker in view of Deng fail to disclose a conversion device such that an influence of a dead time of said voltage conversion device is removed when a voltage command value of said voltage conversion is at least a power supply voltage and at most a predetermined amount, wherein said predetermined voltage is a product of the power supply voltage and a control period length, divided by an effective control period length, the effective control period length determined by subtracting the dead time from the control period length. However, Deng teaches increasing the useable range to the range of W_{\min} to $T_{\text{PWM}} - W_{\min}$. Therefore for the boost topology of DeDoncker in view of Deng, the predetermined voltage would be $(T_{\text{PWM}}/T_{\text{PWM}} - W_{\min})$ and it would have been obvious to one of ordinary skill in the art at the time of the invention to set W_{\min} to the deadtime at least for the reasons of optimization through routine experimentation.

Applicant further argues it is necessary to prevent the upper and lower arms from being turned on simultaneously. However the upper and lower would not turn on simultaneously since the narrow pulse is eliminated and shoot through current is prevented. Furthermore the charging and discharging of the inductor would not prohibit the narrow pulse elimination since the current is free to re-circulate through the diodes.

Applicant argues Deng merely teaches ways to reduce voltage range loss, but reducing the voltage range loss by eliminating the narrow pulse would remove the influence of the deadtime ("Consequently, the effect of the dead-time is removed by the technique of narrow pulse elimination", Deng column 6, lines 29-30).

Double Patenting

Applicant's arguments that the amendment to the claims has rendered the amended claims distinct is found persuasive and the provisional obviousness-type double patenting rejections have been removed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Doncker (US 5,373,195) in view of Deng (US 6,714,424).

With respect to Claim 12, De Doncker discloses a voltage conversion device (Fig. 2) variably changing an input voltage (Fig. 2 +dc link) to be applied to an inverter

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(Fig. 2 10) driving a motor (Fig. 2 14), comprising: a voltage converter (Fig. 2 20) executing voltage conversion between a power supply (Fig. 2 22) and said inverter; and a control device (Fig. 2 40) controlling a switching duty of an upper arm (Fig. 2 TB1) and a lower arm (Fig. 2 TB2) included in said voltage converter (Fig. 2 20). De Doncker does not disclose the duty cycle as the desired output voltage of the dc link approaches the supply voltage from the battery.

Deng teaches narrow pulse width elimination (Fig. 6) in an inverter to minimize voltage range loss and eliminate the effect of dead-time. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide narrow pulse elimination to the voltage converter (Fig. 2 20) when the desired dc link voltage approaches the input supply voltage from the battery (Fig. 2 22) and the duty cycle of TB2 approaches a narrow pulse width. Therefore the duty cycle of TB2 would be maintained at 0 when a voltage command value of said voltage conversion is at least a power supply voltage (Fig. 2 +dc bat) and at most a predetermined voltage $[+dc\ bat \cdot T_{PWM}/(T_{PWM}-W_{min})]$, where W_{min} is the deadtime. The reason for doing so was “to expand the voltage utilization range for solid-switch power converters with certain DC voltages” (Deng column 3, lines 34-35) and to optimize the minimum pulse width, as through routine experimentation. See MPEP 2144.05 II A Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions

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of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In *re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”); In *re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In *re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In *re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

With respect to Claim 16, De Doncker in view of Deng disclose the voltage conversion device according to claim 12, wherein said voltage converter variably changes said input voltage (+dc link) in a linear manner (De Doncker Fig. 3), since the nonlinear effect of the dead-time is removed when the DC link voltage is near the battery voltage.

Allowable Subject Matter

Claims 17-18, 20-23, 25 and 30 are allowed. See the action dated 2/2/09 for the reasons for allowance.

Claims 13, 15 and 27-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With respect to Claim 13, the prior art does not disclose or suggest, in combination with the limitations of the base claim and any intervening claims, primarily, wherein controlling a switching duty of an upper arm and a lower arm included in said voltage converter so that an influence of a dead time of said voltage converter is removed, when a voltage command value of said voltage conversion is at least a power supply voltage and at most a predetermined voltage, wherein said predetermined voltage is a product of the power supply voltage and a control period length, divided by an effective control period length, the effective control period length being determined by subtracting the dead time from the control period length, wherein said control device controls said voltage converter by fixing said switching duty when said voltage command value is at least said power supply voltage and at most said predetermined voltage.

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With respect to Claim 15, the prior art does not disclose or suggest, in combination with the limitations of the base claim and any intervening claims, primarily, controlling a switching duty of an upper arm and a lower arm included in said voltage converter so that an influence of a dead time of said voltage converter is removed, when a voltage command value of said voltage conversion is at least a power supply voltage and at most a predetermined voltage, wherein said predetermined voltage is a product of the power supply voltage and a control period length, divided by an effective control period length, the effective control period length being determined by subtracting the dead time from the control period length, wherein when said control device controls said voltage converter to decrease an output voltage of said voltage converter, said control device fixes said switching duty when said voltage command value reaches a value of at least said power supply voltage and at most said predetermined voltage.

The aforementioned limitations in combination with all remaining limitations of the respective claims are believed to render the aforementioned indicated claim and any dependent claims thereof patentable over the art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HARRY BEHM whose telephone number is (571)272-8929. The examiner can normally be reached on 7:00 am - 3:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash N. Gandhi can be reached on (571) 272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Behm/
Examiner, Art Unit 2838